United States Patent [19]

Gumb et al.

[11] **3,916,119**

[45] **Oct. 28, 1975**

[54] **TELEPHONE SWITCH**

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[73] Assignee: **Northern Electric Company Limited,** Montreal, Canada

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[52] **U.S. Cl.** **179/164**

[51] **Int. Cl.²** **H04M 1/08**

[58] **Field of Search** ..... 179/100 R, 100 D, 159, 179/164

[56] **References Cited**

UNITED STATES PATENTS

3,027,432	3/1962	Jordan et al.	179/164
3,165,597	1/1965	Nordstrom et al.	179/164

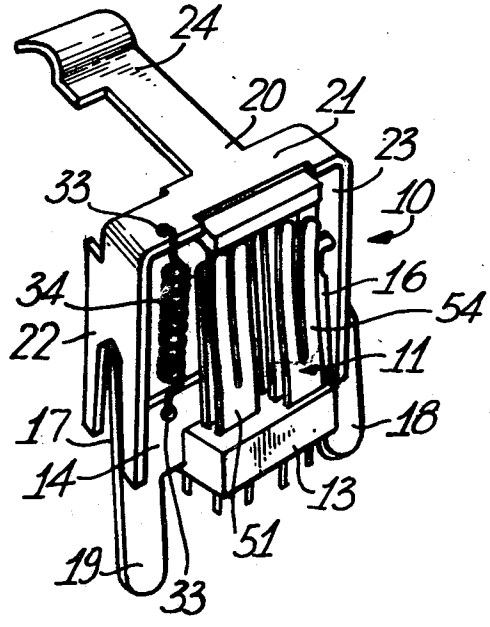
Primary Examiner—William C. Cooper

Attorney, Agent, or Firm—Sidney T. Jelly

[57] **ABSTRACT**

A switch for a telephone, in particular the switch hook assembly, is adapted to plug in receiving sockets provided in the telephone housing, instead of being attached by screws. The switch is generally of conventional form, with a frame mounted on a base, the base carrying the various contacts. The frame is provided with legs which are inserted into sockets - for example hollow bosses molded as part of the telephone housing. A resilient retaining member can be provided for retaining the assembly in position.

8 Claims, 12 Drawing Figures



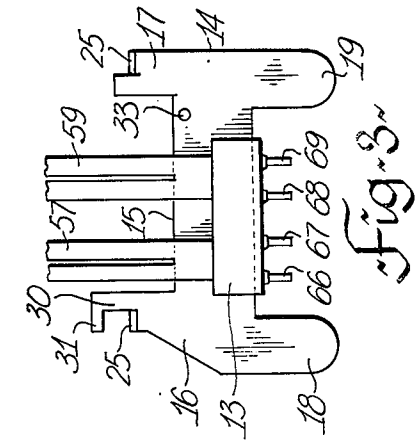


Fig. 3

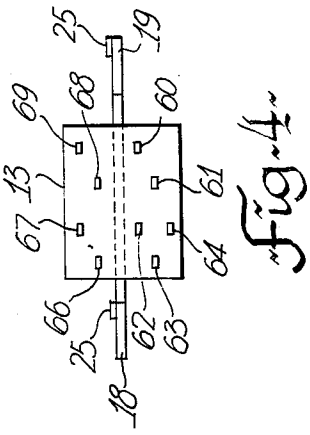


Fig. 4

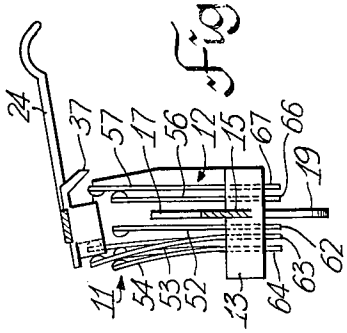


Fig. 5

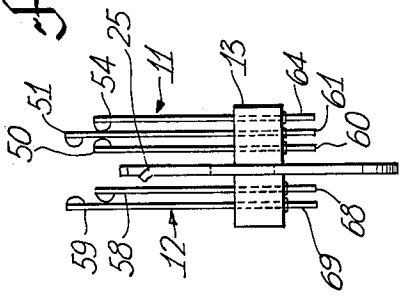


Fig. 2

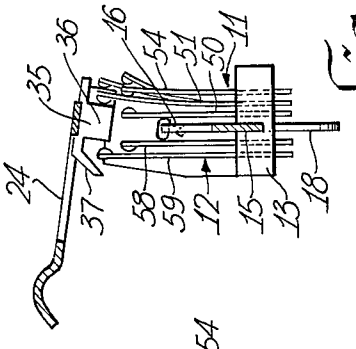


Fig. 8

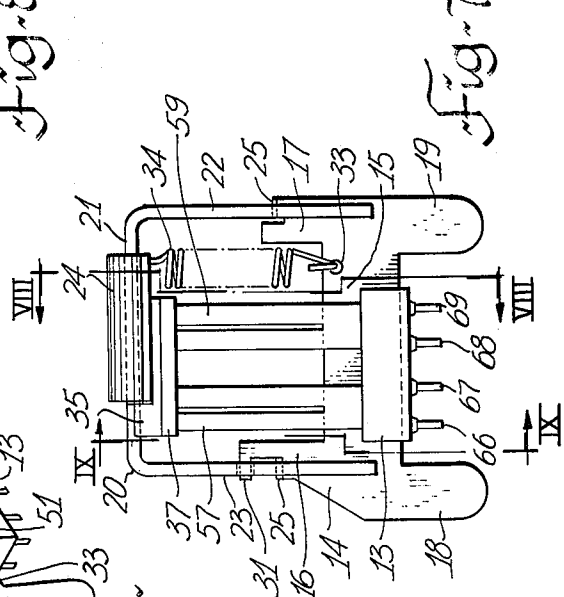


Fig. 7

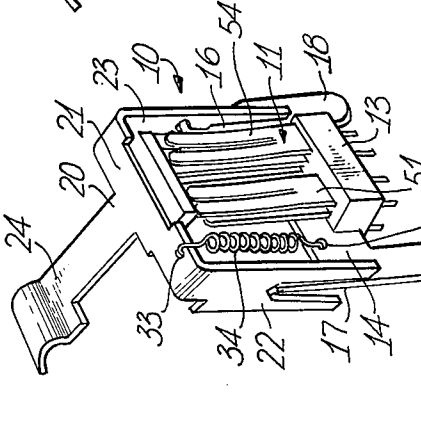


Fig. 1

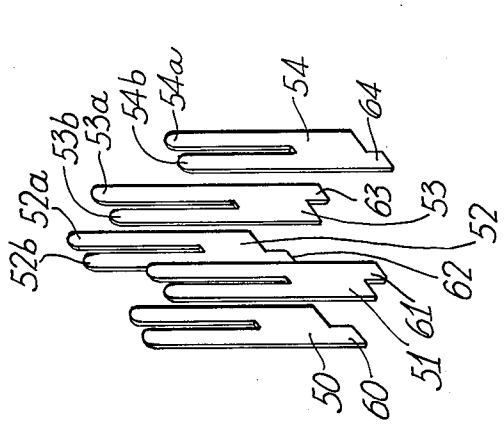


Fig. 10

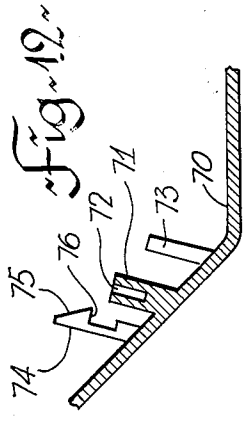


Fig. 12

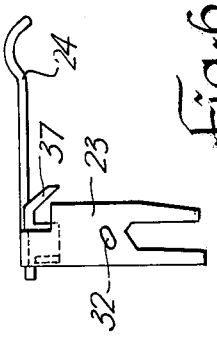


Fig. 6

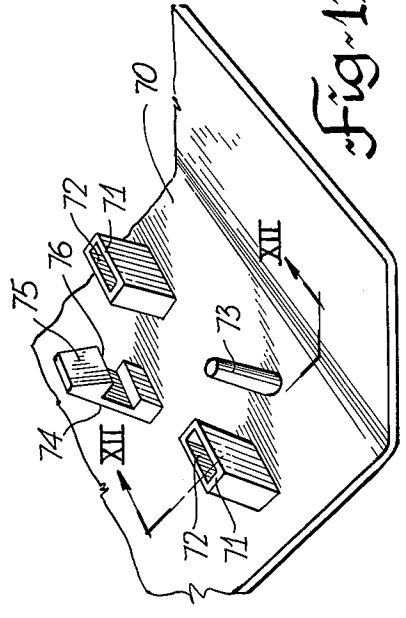


Fig. 11

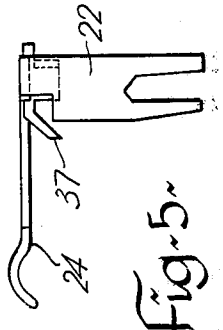


Fig. 5

TELEPHONE SWITCH

This invention relates to a telephone switch and more particularly to a switch hook assembly for a telephone, and to telephone sets incorporating switch hook assemblies.

A telephone switch hook comprises a series of coöperating contact springs, a card member which acts on the contact springs to selectively make and break contacts, a lever arm which moves the card member and a spring which is biased to return the card member and lever arm to a position-referred to as the on-hook position-that is a position which occurs when the handset is removed from its normal resting place on the telephone set housing.

Such switch assemblies are usually attached to a housing of a telephone set by screws, electrical leads being soldered to the contact springs. Usually short lengths of conductor wire are soldered to the contact springs prior to assembly of a switch, the wires then being led to a connecting block where they are attached by screws, the ends of the wires having space terminals at their end. Thus installing a switch entails connection of several wires or leads after which the switch has to be positioned and held during insertion and tightening of two or more screws into the telephone housing.

The present invention provides a telephone switch which is plugged into the telephone housing. In particular, the switch is attached to the telephone housing by the insertion, or "plugging in", of frame members into receiving recesses formed in the telephone housing. Thus installation is simple. Resilient retaining means may be provided and removal of a switch only requires slight flexing of the retaining member and the switch is then pulled out.

The invention will be readily understood, and various features appreciated, by the following description of an embodiment, by way of example, in conjunction with the accompanying drawings, in which:-

FIG. 1 is a perspective view of a switch;

FIG. 2 is an end view of the switch of

FIG. 1 with the lever arm and card member removed to show the base, contact springs and frame;

FIG. 3 is a side view of the switch as in FIG. 2;

FIG. 4 is a base view of the switch as in FIGS. 2 and 3;

FIG. 5 is an end view of the lever arm and card from one end;

FIG. 6 is an end view of the lever arm and card from the other end;

FIG. 7 is a side view of the switch assembly of FIG. 1 in the direction of arrow A in FIG. 1;

FIG. 8 is a cross-section on the line VIII—VIII of FIG. 7;

FIG. 9 is a cross-section on the line IX—IX of FIG. 7;

FIG. 10 is a perspective exploded view of one set of contact springs;

FIG. 11 is a perspective view of one form of mounting in a telephone set for the switch of FIG. 1; and

FIG. 12 is a cross-section on the line XII-XII of FIG. 11.

The switch **10** illustrated in the drawings, comprises a plurality of contact springs arranged generally in two groups **11** and **12**. The contact springs are mounted in a base **13**. Base **13** is conveniently molded about the base parts of the spring contacts and also carries a frame **14**. Frame **14** has a cross-member **15** which is attached to the base **13**, upwardly extending legs **16** and **17**, and downwardly extending legs **18** and **19**. Supported on the top ends of legs **16** and **17** is a lever arm **20**. Lever arm **20** has a central web **21**, two downwardly extending legs **22, 23** and a forward extending arm **24**.

The lower ends of legs **22, 23** of lever arm **20** are bifurcated and fit over the top ends of the upwardly extending legs **16** and **17** of the frame **14**. As seen in FIGS. **2, 3** and **4** a portion **25** of the top edge of legs **16** and **17** is bent over slightly and the ends of the bifurcated portions of legs **22** and **23** pivot on the thin portions **25**. One leg-**16**-of the frame has a short extension **30** having a lateral projection **31**. In the corresponding leg **23** of the lever arm a short inclined slot **32** is formed. When the lever arm **20** is resting on the frame **14** the projection **31** registers in the slot **32**. In the central web **21** of the lever arm and the crossmember **15** of the frame are holes **33** and a tension spring **34** extends between lever arm and frame the ends of the spring being anchored in the holes **33**.

Carried on the central web **21** of the lever arm **20** is a card member **35**. Card member **35** has a central portion **36** which extends downwardly beneath the central web **21**. A downward extension **37** on one side of the card member acts as a shield over the tops of one group of contact springs -group **12**. The groups of spring contacts vary. Group **11** has five spring contacts, two contacts **50** and **51** forming one contact unit and three contacts **52, 53,** and **54** forming another contact unit. The contact springs **50** and **51** are bifurcated in the usual way but work together as one unit to make or break a single connection and are biased to be normally in contact. Contact springs **52, 53** and **54** are also bifurcated. Contact springs **53** makes contact with contact springs **52** or with contact springs **54**. However the two parts of contact spring **53** acts independently at some positions. There is a local thickening or protrusion **55** on the central portion **36** of the card member **35** which acts on one part, **53***a*, only of contact spring **53** at certain operative positions, as will be explained later. Contact spring **53** is biased to make contact with contact spring **52**.

Group **12** has four contact springs **56, 57, 58** and **59**. Spring contacts **56** and **57** act together as a unit making and breaking one connection. Similarly spring contacts **58** and **59** act as a unit making and breaking one connection. Spring contacts **57** and **59** are biased to make contact with spring contacts **56** and **58**. The spring contacts in both groups are actuated by the central portion **36** of the card member **35**. The spring contacts **50,** 51, 52, 53, 54, 56, 57, 58 and **59** extend through the base **13** and have terminals **60, 61, 62, 63, 64, 66, 67,** 68 and **69** respectively projecting downwardly. FIG. **10** is a diagrammatic exploded view of the contact springs forming group **12** and the actuation of the various contacts will be readily seen in conjunction with the following description.

Considering operation of the switch, and starting with the condition that the switch is "on-hook", that is the handset is removed, the spring **34** pivots the lever arm, the lever **24** swinging up and the card member moving to the right as seen in FIG. **8**. The central portion **36** of the card member **35** has closed contact springs **53** against contact spring **54,** breaking contact

between contact springs **53** and **52.** Due to the local protrusion **60** on the central portion of the card member contact part **53***a* of contact springs **53** breaks contact with contact part **52***a* and makes contact with contact part **54***a* before contact part **53***b*breaks contact with contact part **52***b* . Eventually part **53***b* breaks contact with contact part **52***b* and makes contact with contact part **54***b* . Thus there is a sequential transfer by contact spring **53** from contact spring **52** to contact spring **54** with contact spring **53** at all times in contact with one or other of contact springs **52** and **54.**

Pivoting of the lever arm, and the card member **35** also breaks contact between contact springs **51** and **52.** At the same time, the movement of the central portion **36** has permitted contact springs **52** and **59** to move into contact with contact springs **56** and **58** respectively.

Replacing the handset, or otherwise pushing down the arm **24** causes the lever arm **20** to pivot against the spring **34,** the card member **35** moving to the left, in FIG. **8.** This movement breaks contact between spring contact **56** and **57;** and also **58** and **59.** Simultaneously, contact springs **50** and **51** make contact and a sequential contact transfer by spring contact **53** occurs. First contact part **53***b*breaks contact with contact part **54***b*and makes contact with contact part **52***b*and then contact part **53***a* breaks contact with contact part **54***a*and makes contact with contact part **52***a.*

The contact springs produce certain loadings on the lever arm **20.** Conveniently these loadings and the bias of the spring **34** are arranged so as to be substantially constant during movement of the lever arm from one position to the other, in the known manner.

The downwardly extending legs **18** and **19** provide attachment means for mounting the switch on a telephone housing. FIGS. **11** and **12** illustrate one form of mounting in a telephone housing base **70.** Two rectangular hollow bosses **71** are molded as part of the telephone housing base, the slots **72** in the bosses **71** of a size and shape to accept the legs **18** and **19.** The bosses are spaced apart the same distances as the legs **18** and **19.** Slightly forward of the bosses **71** is a solid boss **73,** and slightly rearward of the bosses **71** is an upwardly extending retaining member **74.** When a switch **10** is mounted by pushing legs **18** and **19** into the slots **72** of the bosses **71,** the bottom surface of the base member **13** rests on the top of the boss **73.** As the switch is pushed down the rear edge of the boss **13** slides down the inclined face **75** of the retaining member **74** flexing it rearward slightly, until the switch is right down, when the lip **76** engages over the top surface of the base member **13.** To remove the switch the retaining member is first flexed rearward slightly to disengage the lip **67** from engagement with the base member **13.**

Connections are made to the terminals **60, 61, 62,** 63, 64, 66, 67, 68 and **69** by soldering electrical conductors (not shown) thereto. It is also possible to provide a connector block into which the terminals **60** to **69** can be pushed, the connecting block either being attached to the switch when the switch is mounted on the housing, or the connecting block can be positioned on the housing between bosses **71** and **73** and retaining member **74** before mounting of the switch. Mounting of the switch will also cause the terminals to connect with the connector block.

What Is Claimed Is:

1. A telephone switch comprising:

a frame including a planar cross member, spaced apart downwardly extending legs and spaced apart upwardly extending legs, said legs substantially in the same plane as said cross member, a base mounted on said cross member;

a lever arm pivotally mounted on said upwardly extending legs;

a plurality of contact members mounted on said base;

a card member on said lever arm, said card member operative to make and break contacts between selected pairs of said contact members on pivoting of said lever arm;

resilient means urging said lever arm to a predetermined pivotal position on said frame, said downwardly extending legs adapted to be inserted in cooperative recesses formed in said telephone housing.

2. A telephone switch as claimed in claim **1,** said contact members arranged in two groups, a group on each side of said planar crossmember;

said card member pivotal from one pivot position to another, and engaging one group of contact members in one pivotal position and engaging the other group of contact members in the other pivotal position.

3. A telephone switch as claimed in claim **1,** said lever arm including spaced apart downwardly extending legs, the lower ends of said legs of said lever arm bifurcated, the bifurcated parts fitting over the upper ends of said upwardly extending legs of said frame and pivotal thereon.

4. A telephone switch as claimed in claim **3,** including an upwardly extending extension on the upper end of one of said upwardly extending legs of said frame and a lateral projection on said extension, and a hole in the related downwardly extending leg of said lever arm, the lateral projection positioned in said hole.

5. A telephone switch as claimed in claim **4,** said hole a slot extending in a lateral direction across said leg.

6. A telephone switch as claimed in claim **1,** said contact members extending through said base and terminals formed on the ends of said contact members.

7. A telephone set comprising:

a housing and a hook switch mounted on said housing, said hook switch comprising:

a frame including a planar cross member, spaced apart downwardly extending legs and spaced apart upwardly extending legs, said legs in planes substantially parallel to the plane of said planar cross member;

a base mounted on said cross member;

a lever arm pivotally mounted on said upwardly extended legs;

a plurality of contact members mounted on said base;

a card member on said lever arm, said card member operative to make and break contacts between selected pairs of said contact members on pivoting of said lever arm;

and resilient means urging said lever arm to a predetermined pivotal position on said frame;

said housing including spaced apart recesses positioned for the reception of said downwardly extending legs of said hook switch.

8. A telephone set as claimed in claim **7,** including a resilient retaining member to retain said hook switch in position in said housing, said retaining member comprising an upwardly extending member having an en-

larged portion at its upper end, said enlarged portion including a downwardly and outwardly inclined face, and a lip beneath said inclined face, the arrangement such that on insertion of the downwardly extending legs in said recesses in said housing, said base of said hook switch moves down said downwardly and outwardly inclined face flexing said retaining member, said lip engaging over said base when said hook switch is completely inserted.

* * * * *